

REMARKS/ARGUMENTS

Favorable reconsideration of the present application is respectfully requested.

Claims 2 and 4 have been allowed. Claim 1 and its dependent Claim 3 have been rejected in view of the prior art.

Claim 1 has been amended to recite that the clutch operating device is provided for bringing the outer and inner clutch plates selectively in to and out of frictional engagement “while pressing at least one of said outer and inner clutch plates against the bottom of the cylindrical front housing.” Basis for this is evident from the geometry of the clutch plates in the figures. For example, Figure 1 illustrates that the leftmost outer clutch plate will inherently be pressed against the bottom of the cylindrical front housing 12 during the engagement of the clutch. The claims have also been amended responsive to the objection thereto.

It is an object of the invention to provide a drive power transmission device and differential gear having a simplified design. It has conventionally been considered desirable to fabricate a combined drive power transmission device and differential gear from a number of components, for a variety of reasons. For example, the inner shaft and gear shaft in the drive power transmission device described in U.S. patent 6,622,838 were formed from separate parts in order to permit the individual sections to be manufactured and tested separately. U.S. patent 6,530,460 (Gradu) discloses a drive power transmission device and differential gear which are also formed from a multiplicity of parts. For example, a subassembly is comprised by the ramped plate 65 and clutch plate 70 which are spline mounted on the shaft member 15 and secured thereto by the nut 60, wherein the clutch discs 160 and 165 are held between the flange 155 of the clutch plate 70 and the ramped surface 185 of the ramped plate 65. This subassembly can therefore retain the clutch discs 160 and

165 so that the shaft 15 and the subassembly mounted thereon can be mounted with precision in the clutch drum 112.

In the absence of an element such as the clutch plate 70 assembled onto the shaft 15 to create a subassembly for retaining the clutch discs 160 and 165, the assembly of the drive power transmission device and differential gear would be exceedingly difficult. For example, two assembly methods are described on page 10 of the present specification, a first in which the shaft end portion is located within the bottomed cylindrical front housing and the clutch plates are alternately inserted into the clutch housing to be spline engaged with the housing and gear shaft; and a second in which the clutch plates are brought into spline engagement with the housing and the gear shaft after the assembly of the differential gear with the drive gear of the gear shaft. However, each of these known methods is difficult to carry out in practice, as is described at the bottom of page 10.

Creating a subassembly of parts to hold the clutch discs on the shaft during assembly of the shaft in the clutch housing, as in Gradu, simplifies the step of assembling the shaft in the clutch housing but creates a complex structure requiring, for example, the clutch plate 70 having the flange 155 and the ramped plate 65 having the ramped surface 185. In view of the disclosed assembly method relying upon an assembling tool, the present invention provides a simplified construction in which the inner clutch plates are engaged with an engaging portion formed on the gear shaft itself so that any separate component for forming a subassembly, such as the clutch plate 70 of Gradu, is not necessary. Thus, the inner clutch plates may be engaged with the engaging portion formed on the gear shaft and, in view of the absence of a retaining subassembly having an element such as the flange 155 of Gradu, the clutch plates may press directly against the bottom of the cylindrical front housing during engagement of the clutch. Such a simplified assembly is made possible because of the use of an assembly

method relying upon an assembling tool rather than a subassembly of parts mounted to the gear shaft.

Claim 1 was rejected under 35 U.S.C. § 103 as being obvious over Gradu in view of U.S. patent 5,083,986 (Teraoka et al). According to this rejection, Gradu discloses all of the features of Claim 1 except for the clutch inner plates being engaged with the gear shaft itself, the inner plates of Gradu instead engaging the clutch plate 70 (“engaging portion”) mounted to the gear shaft. However, the Examiner deemed this to have been obvious to one skilled in the art in view of Teraoka et al which discloses inner clutch plates splined directly to a shaft.

The purported motivation for the modification of Gradu in view of Teraoka et al as set forth in the Office Action is that it simply comprises making plural parts unitary, which the Examiner considers to be “within the general skill of a worker in the art.” Applicants recognize that In re Larson, upon which the Examiner has relied, stands for the general proposition that modifying the prior art as a one piece construction is merely a matter of obvious engineering choice. However, the Examiner’s attention is also respectfully directed to Schenck v. Norton Corp., 218 USPQ 698 (Fed. Cir. 1983); (M.P.E.P. § 2144.04(V)(B)) which creates an exception to this general rule where the invention is contrary to the understandings and expectations of the art.

In fact, for the reasons explained above, the presently claimed invention is contrary to the understandings and expectations of the art. Certainly, a one piece construction provides simplicity and would have been adopted if it were in fact obvious to those skilled in the art. However, the art has instead adopted complex multi-part constructions for reasons such as ease of assembly. The failure of the prior art to adopt this seemingly obvious expedient of a unitary construction is evidence of the actual unobviousness thereof. It is only when one skilled in the art becomes aware of the assembly method disclosed in the present specification that it becomes obvious to provide the inner clutch plates engaged with the gear shaft itself.

Additionally, Teraoka et al would not provide a suggestion for modifying Gradu such that the inner clutch plates are engaged with the shaft, thereby eliminating the subassembly in Gradu. As already explained, the separate clutch plate 70 in Gradu is advantageous for creating a subassembly which can retain the clutch plates during assembly into the bottomed clutch drum 112. Teraoka et al, on the other hand, does not have a bottomed clutch drum but instead uses a multi-part drum construction in which the drum 1031 is divided into separate cylinder and end elements (Figure 1A), and so the problem of inserting the clutch plates into a bottomed cylinder does not arise in Teraoka et al. Teraoka et al would thus be incapable of motivating those skilled in the art to eliminate the separate clutch plate 70 in the transmission device and differential gear of Gradu which has a bottomed clutch drum.

Finally, in order to further distinguish Claim 1 from the prior art, the claim has further been amended to recite that at least one of the clutch plates is pressed against the bottom of the cylindrical front housing during the engagement of the clutch. This may be contrasted with Gradu in which the clutch pack is pressed against the flange 155 of the clutch plate 70. Additionally, it would not have been obvious to have eliminated the flange 155 in view of Teraoka et al since Teraoka et al lacks a bottomed cylindrical housing.

Claim 3 depends from Claim 1 and further recites an assembly method including a step of inserting an assembling tool into a reference bore of the housing and a step of inserting the clutch plates into the clutch receiving chamber while engaging the plates with the assembling tool. Claim 3 was rejected under 35 U.S.C. § 103 as being obvious over Gradu in view of Teraoka et al, and further in view of U.S. patent 4,231,147 (Witt) which was cited for teaching the use of an assembling tool for installing clutches in a transmission case. However, whatever teaching Witt may have in this respect, it provides no further suggestion that, by virtue of the use of such a tool in the assembly of a drive power transmission device and differential gear, one can engage the inner clutch plates onto the gear

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shaft so that a simplified construction is possible. Accordingly, no combination of the above references would anticipate or render obvious the subject matter or Claim 1 from which Claim 3 depends.

Applicants therefore believe that the present application is in a condition for allowance and respectfully solicit an early Notice of Allowability.

Respectfully submitted,

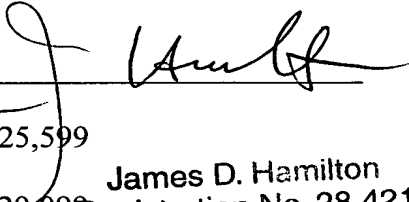
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